

COURSE SYLLABUS

1. Program information

1.1. Institution	Petroleum-Gas University of Ploiești
1.2. Faculty	Petroleum Technology and Petrochemistry
1.3. Department	Petroleum Processing and Environmental Protection Engineering
1.4. Field of study	Chemical Engineering
1.5. Study cycle	License
1.6. Study program	Chemical Engineering for Refineries and Petrochemical Industry

2. Course information

2.1. Course title	Lubricants and additives		
2.2. Course coordinator	Assoc.Prof.Liana Bogatu		
2.3. Laboratory / seminar coordinator	Assoc.Prof.Liana Bogatu		
2.4. Project coordinator	-		
2.5. Year of study	I		
2.6. Semester *	I		
2.7. Evaluation type	Exam		
2.8. Course type - formative category **	DS	2.9. Type of subject matter ***	C

* the semester number is in accordance with the curriculum;

** fundamental = DF; domain = DD; speciality = DS; complementary = DC; thoroughgoing = DA; synthesis = DSI.

*** compulsory = C; optional = O; elective = E

3. Total estimated time (teaching hours per semester)

3.1. Number of hours per week	5	of which: 3.2. course	2	3.3. Seminars/laboratories	3	3.4. Project	-
3.5. Total hours from curriculum	70	of which: 3.5. course	28	3.6. Seminars/laboratories	42	3.7. Project	-
3.8. Time distribution							hours
Study of textbook, course support, bibliography and notes							20
Further reading in the library, on online platforms and fieldwork							6
Preparing seminars / laboratories, homework, portfolios and essays							5
Tutoring							2
Examinations							2
Other activities							-
3.7. Total hours of individual study	35						
3.8. Total hours per semester	105						
3.9. Number of credits	7						

4. Prerequisites (where applicable)

4.1. curriculum	<ul style="list-style-type: none"> ➤ Science of Materials ➤ Lube oils Manufacturing Technology
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	<ul style="list-style-type: none"> ➤ Petroleum Distillation Technology ➤ Thermo-catalytic Processes in Petroleum Industry
4.2. skills	<ul style="list-style-type: none"> ➤ Knowledge of petroleum products properties ➤ Knowledge of base oils manufacturing ➤ Knowledge of mechanic phenomena, of friction, wear, corrosion etc.

5. Requirements (where applicable)

5.1. course	<ul style="list-style-type: none"> ➤ Standard classroom. ➤ Video projector and screen.
5.2. seminars/laboratory	<ul style="list-style-type: none"> ➤ Laboratory equipped with modern instruments and equipment for analysis of base oils and lubricating oils. ➤ Base oils, additives

6. Specific competences

Professional competences	<p>Defines the process and designs technical components: the description, analysis and advanced use of fundamental concepts and theories in the field of chemical engineering.</p> <p>Designs equipment and apparatus for utilities: the design of apparatus, processes and installations with the application of knowledge in the field of chemical engineering.</p>
Cross-curricular competences	<p>The ability to provide permanent information and documentation in his/her field of activity, but also in related fields, both in Romanian and in an internationally spoken language.</p> <p>Efficient and effective performance of individual professional activities, in conditions of autonomy and professional independence.</p> <p>The ability to carry out professional tasks as a team leader.</p>

7. Course objectives (based on the competence grid)

7.1. General objective	<ul style="list-style-type: none"> ➤ The general objective of the discipline is the study of liquid and solid lubricants used in various fields, in concrete applications and specific requirements. In the course are presented general notions of tribology, main characteristics of lubricants, grouped on certain criteria, types of basic oils and main classes of additives, modern requirements and current trends in the manufacture of lubricants. ➤ An important part of the course is dedicated to presenting the main categories of liquid and greasy lubricants, as well as their specific applications.
7.2. Specific objectives	<p>After passing the discipline, students will be able to:</p> <ul style="list-style-type: none"> ➤ analyze and evaluate the physico-chemical characteristics of lubricants;

	<ul style="list-style-type: none"> ➤ develop methods to improve the physico-chemical characteristics of lubricants by adding of the appropriate types of additives; ➤ evaluate different type of lubricants, classify them and determine their areas of use.
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8. Contents

8.1. Course	Time	Teaching methods	Comments
1. Basic of tribology	4 hours	Interactive and student-centered	
2. Physical and chemical properties of lubricants. The correlation between the applications, specific functions and characteristics of lubricants.	6 hours	Interactive and student-centered	
3. Base oils and additives: representative types, specific chemical structure, correlation between structure and properties.	6 hours	Interactive and student-centered	
4. Types of representative liquid lubricants. Classification, quality standards, formulation and evaluation of the lubricants.	8 hours	Interactive and student-centered	
5. Types of representative of semi-liquid and solid lubricants and specific applications.	2 hours	Interactive and student-centered	
6. Biolubricants. Lubricants obtained from regenerated oils	2 hours	Interactive and student-centered	
Bibliography 1. Papers documenting the topic of the course, published in specialized journals between 2010 and 2020 2. Mang Th., Dresel, W., Lubricants and Lubrication, ISBN 978-3-32670-9, publishing house WILEY-VCH, 2017. 3. Tănăsescu, C., Lubricants Manufacture Technology, Petrol-Gas University publishing house, 2002. 4. Florea, F., Tribology, Universal Cartfil publishing house, Ploiești, 2000. 5. Pavelescu, D., Mușat, M., Tudor, A., Tribology, Didactic and pedagogical publishing house, București, 1977. 6. Popa, St., Dobrescu, C., Petrof, M., Florea, F., Popescu, A., Andronie, Gh., Mineral lubricants for industrial processes, Technical publishing house, București, 1978. 7. Denis, J., Briant, J., Hipeuax, J.C., Physico-chimie des lubrifiants, Analyses et Essais, Technip publishing house, Paris, 1997. 8. *** Afton Chemical, Specification handbook 2012.			
8.2. Seminar / laboratory	Time	Teaching methods	Comments
1. Testing and evaluating the physico-chemical characteristics of base oils	12 hours	Interactive and student-centered	
2. Testing and evaluation of the rheological, oxidation resistance and anti-corrosive properties of lubricants.	10 hours	Interactive and student-centered	

3. Testing and assessing the anti-wear and extreme pressure characteristics of lubricants	8 hours	Interactive and student-centered	
4.Characterization of consistent greases	6 hours	Interactive and student-centered	
5.Assessment of lubricant compliance	6 hours	Interactive and student-centered	
Bibliography 1. Annual Book of ASTM Standards, Section 5: Petroleum Products, Lubricants, and Fossil Fuels ISBN 978-1-6822-1440-4, 2018. 2.Tănăsescu, C., Cursaru, D., Jugănar, T., Bogatu, L., Lubricants technology- guide for laboratory and numerical applications, Petrol-Gas University publishing house, 2010.			
8.3. Project	Time	Teaching methods	Comments
Bibliography			

9. Correlation of the course contents with the demands of the epistemic community representatives, professional associations and representative employers in the field of the program

- The course syllabus was developed in cooperation with representatives of engineering companies in Ploiești and Bucharest that have hired graduates of similar master programs.

10. Evaluation

Activity	10.1. Evaluation criteria	10.2. Evaluation methods	10.3. Percentage of final grade
10.1. Course	Acquiring basic knowledge about lubricants and additives	Written paper	70%
	Acquiring specific knowledge of each topic and preparing reports	Written paper	30%
10.2. Seminar / laboratory	Acquiring of knowledge on the characterization of lubricants. Solving specific numerical applications	Evaluation of numerical applications, reports and processing of experimental results	100%
10.3. Project		-	-
10.4. Minimum performance standard			

- All the topics of the exam should be accomplished for reaching at least 5 score.
- Laboratory work carried out in full.
- The final grade is composed of the score achieved for the acquisition of general knowledge (minimum 5 points), the score achieved for the presentation of projects based on topics studied during the semester, and one ex officio point.

Signature
date

05.02.2025

Course coordinator



Seminar/laboratory
coordinator



Project coordinator

Date of approval in the
department

__20.03.2025__

Head of department
Associate Prof. PhD. eng.
Mihaela Neagu



Dean
Assistant Prof. PhD. eng. Cristina
Duşescu-Vasile

